

CLAIMS

What is claimed is:

1. A vented shield system for use in a plasma arc torch comprising:
a shield cup body defining a distal end portion and at least one gas passage extending along the distal end portion;
a shield cap disposed proximate the distal end portion of the shield cup body; and
a flow control member disposed within the shield cap,
wherein a portion of a secondary gas flowing through the plasma arc torch is vented distally through the flow control member and another portion of the secondary gas is vented proximally through the gas passage.
2. The vented shield system according to Claim 1 wherein the portion of secondary gas flowing through the flow control member defines a flow rate and the portion of secondary gas flowing through the gas passage defines another flow rate such that the flow rate of the secondary gas flowing through the flow control member is approximately the same as the flow rate of the secondary gas flowing through the gas passage.
3. The vented shield system according to Claim 1, wherein the shield cap defines a distal face and a plurality of channels formed in the distal face, the channels providing gas flow passages and molten material passages.
4. The vented shield system according to Claim 1, wherein the shield cap defines a distal face to block molten material from contacting portions of the plasma arc torch.

5. The vented shield system according to Claim 1 further comprising four gas passages extending along the distal end portion of the shield cup body.

6. The vented shield system according to Claim 1 further comprising a conductive insert disposed within the shield cup body, wherein a tip of the plasma arc torch contacts the conductive insert for electrical continuity within the anodic potential side of the plasma arc torch.

7. The vented shield system according to Claim 6, wherein the flow control member is nonconductive and provides a proper dielectric to prevent arcing between the tip and the shield cap.

8. A vented shield system for use in a plasma arc torch comprising:
 - a shield cup body defining a distal end portion and at least one gas passage extending along the distal end portion;
 - a shield cap disposed proximate the distal end portion of the shield cup body, the shield cap defining an annular ridge,
 - wherein the annular ridge blocks a secondary gas from flowing proximally through the gas passage of the shield cup body.
9. The vented shield system according to Claim 8, wherein the shield cap further defines an extended distal wall that blocks molten material from contacting portions of the plasma arc torch.
10. The vented shield system according to Claim 8, wherein the shield cap further defines a distal face to block molten material from contacting portions of the plasma arc torch.
11. The vented shield system according to Claim 8 further comprising four gas passages extending along the distal end portion of the shield cup body.
12. The vented shield system according to Claim 8 further comprising a conductive insert disposed within the shield cup body, wherein a tip of the plasma arc torch contacts the conductive insert for electrical continuity within the anodic potential side of the plasma arc torch.

13. A shield cup body for use in venting a secondary gas from a plasma arc torch, the shield cup body defining a distal end portion and at least one gas passage extending along the distal end portion, wherein a portion of a secondary gas flowing through the plasma arc torch is vented proximally through the gas passage.

14. An apparatus for use in venting a secondary gas from a plasma arc torch, the apparatus comprising:

a shield cap disposed proximate a distal end portion of the plasma arc torch; and

a flow control member disposed within the shield cap,

wherein a portion of a secondary gas flowing through the plasma arc torch is vented distally through the flow control member.

15. The apparatus according to Claim 15, wherein the flow control member is nonconductive and provides a proper dielectric to prevent arcing within the plasma arc torch.

16. A method of venting a secondary gas from a plasma arc torch, the method comprising the steps of:

(a) directing a portion of the secondary gas distally through a flow control member in a vented shield system; and

(b) directing another portion of the secondary gas proximally through at least one gas passage in the vented shield system.

17. The method according to Claim 16 further comprising the steps of:

(a) controlling a flow rate of the secondary gas through the flow control member; and

(b) controlling a flow rate of the secondary gas through the gas passage,

wherein the flow rate of the secondary gas flowing through the flow control member is approximately the same as the flow rate of the secondary gas flowing through the gas passage.

18. A method of venting a secondary gas from a plasma arc torch, the method comprising the steps of:

(a) directing a secondary gas distally through a vented shield system;

(b) blocking the secondary gas from flowing proximally through the vented shield system; and

(c) directing the secondary gas distally along an exterior portion of a tip disposed within the plasma arc torch.